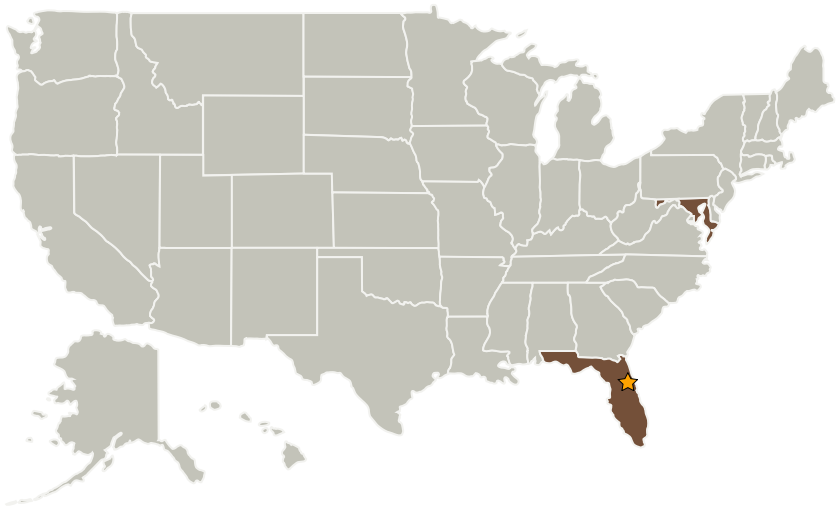
Passive Wireless Cryogenic Liquid Level Sensors Using Orthogonal Frequency Coded Acoustic Wave Devices, Phase I

Completed Technology Project (2006 - 2007)

Project Introduction

This proposal describes the development of passive wireless surface acoustic wave (SAW) based liquid level sensors for NASA application to cryogenic liquid level sensing. Orthogonal Frequency Coded (OFC) SAW devices have been demonstrated as passive wireless temperature sensors in NASA Contract NNK04OA28C, and are being further developed under NNK05OB31C. The proposed liquid level sensors will use damping of the acoustic wave caused by mass loading of the liquid to produce fast, reversible liquid level sensors. The proposed research will apply the results of ongoing work on OFC sensors and will evaluate their operation as liquid level sensors in selected liquids of interest at cryogenic temperatures. Issues to be investigated include the stability of various SAW substrates when exposed to various (extreme and gradual) temperature changes, the effects on device integrity and performance of thermal cycling to cryogenic temperatures, and the effects of device exposure to various liquids and the reversibility thereof. The result of the proposed research will be an understanding of potential failure mechanisms in SAW sensors used at cryogenic temperatures, knowledge of the required operating parameters to ensure device reliability under likely operating conditions, and demonstration of the use of OFC SAW sensors for liquid level detection.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Kennedy Space Center (KSC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Kennedy Space Center(KSC)	Lead Organization	NASA Center	Kennedy Space Center, Florida
SenSanna Incorporated (formerly Applied Sensor Research & Development)	Supporting Organization	Industry Women-Owned Small Business (WOSB), Veteran-Owned Small Business (VOSB)	Arnold, Maryland

Primary U.S. Work Locations	
Florida	Maryland

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.3 Cryogenic